



Digital payments and electronic clearing systems

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Question

What lessons learned are available regarding establishing a digital payment system and electronic clearing systems for banks in contexts where the banking system is really weak and/or in conflict-affected areas (esp. for instance OPTs, Somalia, and Jordan)? What are the main challenges and how were they overcome?

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The K4D helpdesk service provides brief summaries of current research, evidence, and lessons learned. Helpdesk reports are not rigorous or systematic reviews; they are intended to provide an introduction to the most important evidence related to a research question. They draw on a rapid desk-based review of published literature and consultation with subject specialists.

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1. Summary

This rapid review was looking for experience and lessons for establishing digital payment¹ systems where there are weak banking systems, and particularly areas affected by conflict. The search began with Occupied Palestinian Territories, Somalia and Jordan with only Jordan showing results. The search was expanded 'conflict-affected countries' and then 'low income' to broaden the search. The technical nature of the information made rapid screening and synthesising difficult. Country experience was identified from Jordan, Mexico, South Africa, Nigeria, Philippines, Uganda, and Kenya. Details of experience of setting up digital payment in fragile contexts was not identified within the scope of this report. More of the literature discussed the benefits or potential benefits rather than detailing technical set-up which is what this report was concerned with.

The main findings are:

- Considerations must be given to technical infrastructure, for example the need for sufficient ATMs² and management information systems.
- Regulation is important and regulators must be given power to act when required. Regulation should be able to adapt as needs change or become better understood.
- Financial literacy and e-money promotion is required. Reliability is important to build trust to retain uptake.
- Reaching rural areas continues to be challenging for infrastructure and logistics.
- Interoperability, the ability of information to flow between different systems and platforms, is needed for effective functioning.
- Consumer protection must be considered including consumer data privacy, fraud risk, risk of fund loss if there are bank failures, and possibility for consumers to make uninformed choices

Much of the experience identified in this review describes digital systems for social assistance payments. Cards used for disbursing social assistance have advantages and disadvantages. In the South Africa case study a MasterCard was developed using biometric³ and chip technology. It had offline capability so users could conduct transactions with other holders in remote regions via a smart card reader. Technology enabled fast registration and recipients were provided with a bank account for no charge. It can be accepted anywhere MasterCard is accepted or at ATMs (for a charge). The incorporation of biometrics was a key benefit for the government and has large benefits for eliminating ghost accounts. Benefits for those receiving the payments in this way were that they no longer had to queue or travel to pick up their cash and had reduced security risks from not carry cash. See the full report for other individual case studies.

¹ Payments made using digital instruments

² Automatic teller machines

³ Use of physical characteristics to digitally identify a person

2. Case studies

A rapid search on digital payment and electronic clearing was carried out for 'low-income countries', 'conflict-affected', 'Palestine', 'Somalia', and 'Jordan'. Information relevant to the question for Occupied Palestinian Territories and Somalia was not identified. Other countries emerging from the search with experience in this area reported were Mexico, South Africa, Nigeria, Philippines, Uganda, Kenya, and India. This was a broad and technical topic for a rapid search so was by no means exhaustive.

Jordan

JoMoPay is the Jordanian national mobile payment switch⁴. It has created interoperability⁵ for multiple digital payments instruments in Jordan including mobile payment service providers, mobile wallets⁶, bank accounts and prepaid cards. A Consultative Group to Assist the Poor (CGAP) report describes the uptake of mobile cash to be low at the time of the report (Boakye-Adjei et al, 2014). The authors find the agent and acceptance network were limited on the supply side. In 2013 JoMoPay 'mobile payment services instructions' were released which are a solid foundation for the development of e-money. This and the accompanying operational framework⁷ include a consumer complaints procedure, data protection and privacy, protection of consumer funds, and fraud prevention. There are gaps in consumer protection including consumer data privacy, fraud risk, risk of fund loss if there are bank failures, and possibility for consumers to make uninformed choices (Boakye-Adjei et al, 2014).

There are plans to integrate the Jo-NET switch⁸ with JoMoPay so that mobile wallets can be cashed out. Individual banks will need software upgrades to accept mobile payments.

Recommendations from the CGAP report to support digitisation in the domestic payments market include (Boakye-Adjei et al, 2014):

- National marketing campaigns to encourage the transition from cash;
- Support development of the agent network and acceptance network;
- Support capacity for large volume transactions;
- Ensure exchange houses are part of the digital system; and
- Address consumer protection concerns.

Jordan's regulatory process mobile service payment providers is commended as covering all areas of risk management. It is non-discriminatory in theory although challenges exchange houses have faced suggest obstacles.

⁴ A provider which assists in communications between various providers to process payments

⁵ the ability for information to flow between different operating systems and platforms

⁶ A virtual wallet that stores payment information on a mobile device

⁷ <https://dfsobservatory.com/sites/default/files/JoMoPay%20-%20Operational%20Framework.pdf>

⁸ Transaction-based software system

A study investigated consumer's choice to use e-banking systems or traditional systems in Jordan (Abbad, 2010). The author finds perceived ease of use and perceived usefulness to be important. Subjective norms and perception of what others think of e-banking affect consumer choice. Security and trust are a major problem in uptake. People who are experienced with the internet and enjoy the use of it were more likely to use e-banking. A review identifying predictors for digital banking adoption in Gulf countries found similar results (Alkhowaiter, 2020). The best predictors were trust, perceived security and perceived usefulness.

Mexico

The Mexican government is estimated to be saving 1.27 USD per year from digitising and centralising wages, pensions⁹ and social transfers according to Better Than Cash Alliance evidence paper (Babatz, 2013). Between 1997 and 2010 the Ministry of Finance implemented a process that aimed to combine all federal government expenditures within a single IT platform. However, there were problems with coordinating the necessary stakeholders and developing the technical platform. Administrative staff felt threatened by the automisation process. A custom-made platform was built to avoid "the tension of forcing compliance with centralized processes and IT requirements" (p7) but this slowed things significantly and project staff suggest adapting a purpose built system and changing internal procedures. In parallel, the central bank developed a system for issuing electronic instructions. The estimated cost for developing the system is 12 million Mexican dollars.

A World Bank case study looks at the digitisation of social grant disbursement in Mexico (Riley & Kulathunga, 2017). Disbursal in Mexico's Oportunidade social programme were made 66 percent in cash initially. The remaining disbursal was transferred through the state-owned bank with 16 percent through magnetic stripe savings account cards, 12 percent through prepaid smart card accounts, and 6 percent through passbook accounts. The Social Development Secretariat tried out different payment partners to reach rural areas including the state telegraph company (Telecomm), petrol stations, cooperatives, and Diconsa stores. Diconsa is a Mexican government agency which manages community owned stores. In 2010, the government mandated electronic grant payments were centralised with Telecomm and Diconsa as sub-contractors. Recipients with access to banking used a no-fee open debit card for withdrawals at ATMs or point of sale (POS) terminals. Recipients without access to banking have a biometric closed debit card at the bank, Telecomm, or Diconsa touchpoints¹⁰. Diconsa stores had the benefit of being able to provide physical outreach but many were not approved as banking agents. The mandate of the government ended up having limited success as strategic design and planning were insufficient. The time cost for rural recipients to travel to receive the payments were high.

South Africa

To move away from cash payments for social assistance in South Africa, the South African Social Security Agency contracted Cash Paymaster Services¹¹ to deliver disbursements in

⁹ In 2012, 97 percent of payments were made by digital transfer.

¹⁰ A touch point is any way a consumer can interact with a business

¹¹ A subsidiary of Net1 (<http://www.net1.com/>) and aplitec (<http://www.groupe-aplitec.com/>)

partnership with Grindrod bank (Riley & Kulathunga, 2017). The Bank partnered with MasterCard to deliver payments. The Bank was able to hold deposits and clear through the National Payment System. A MasterCard for both online and offline payments was developed using Net 1's Universal Electronic Payment System biometric technology and Visa chip technology. The offline capability meant that users could conduct transactions with other card holders in remote areas via a smart card reader. Technology enabled the cards to be issued and users to be registered quickly. As part of the registration, recipients are given a bank account with no charges. The card can be used anywhere MasterCard is accepted or at ATMs (although banking charges apply here). The card is a single-wallet system but can enable multiple e-wallets. A key benefit of the card from a government point of view was the incorporation of biometrics. And large savings were made from the elimination of ghost accounts. Beneficiaries no longer had to queue or travel for cash payments and had greater security from not carrying cash. There have been, however, controversies and allegations against stakeholders Riley & Kulathunga, 2017).

Nigeria

Qualitative research in Nigeria explored institutional arrangements for the set-up of an electronic payment system according to Briggs & Brooks (2011) in *The Electronic Journal of Information Systems in Developing Countries*. Technological infrastructure of a relatively high standard was put in place by private stakeholders such as banks between 2000 and 2010. The organisation and functions of the Central Bank of Nigeria underwent restructuring in the 1990's with guidelines and frameworks for all payment initiatives established as part of national payment system policy objectives. The aims were for the system to be available without interruption, meet user needs and operate at low cost. A company was incorporated and mandated to provide, same-day clearing, settle inter-bank transfers, automate transactions between banks, increase fund transfer efficiency, and develop a network of interconnectivity and inter-operability. In 2003 the central bank issued guidelines on e-banking which encouraged private card/switch operators to introduce cards, POS terminals and switches. It also encouraged independent service operators for ATMs and POS which made interoperability difficult. A National Payments System Committee (NPSC) was set up to improve stakeholder engagement in addressing issues and cooperating in the provision of services; promote institutionalisation through a comprehensive payment systems legal framework; and facilitate standards and regulations.

The role of regulatory bodies in designing and implementing effective market arrangements for electronic payment systems was problematic (Briggs & Brooks, 2011). The payment system was governed by the operators (mostly financial institutions) whilst regulatory bodies were somewhat passive. Payments products and charges were uncoordinated. Power struggles between regulators and players ensued. Guidelines which were later introduced restricted free entry and participation of operators. Within this structure it was difficult to establish electronic payment systems. Unforeseen issues of payment and settlement challenged every aspect of the payment system. They need to be reviewed and to evolve.

Philippines

The Pantawid Pamilyang Pilipino Program providing conditional transfers in the Philippines is government run and donor-led. The main payment service provider is the Land Bank of the Philippines (LBP) (Zimmerman et al., 2014). 60 percent receive payments over the counter from other payment service providers and 40 percent of recipients have a card to withdraw from LBP or partner teller machines. By 2019 payouts through the cash card had risen to 62 percent

(Acosta et al., 2019). The LBP card has limits to functionality such as limited time for fund storage, withdrawals only from limited infrastructure, and additional funds may not be deposited (Zimmerman et al., 2014). It links recipient's names to the account where money is stored but is not used as a typical debit card. There are plans to expand the functionality from a single purpose card so that different sources can deposit funds and beneficiaries can use at point-of-sale as well as ATMs (Acosta et al., 2019). The Land Bank charge a low transaction fee of 0.7 percent, found to be lower than schemes in other countries which used payment service providers who spent more on ensuring reliability (Zimmerman et al., 2014). There is a small fee to pay per card issued. A charge is incurred for withdrawing from ATMs which are not in the Land Bank network. For manual payments, the only additional costs are travel and time costs.

The programme reimburses the bank up to 20 Philippine Pesos (PHP) for ATM transactions (Acosta et al., 2019). For those that don't have access to ATMs, the LBP contract other financial conduits including countryside financial institutions, cooperatives, NGOs, and telecommunication companies. Transaction fees vary depending on the contract and area. Competitive bidding for contracts is annual so conduits do not have time and money to invest in infrastructure or the utilisation of e-money.

Negative experiences such as queuing for ATM withdrawal brings negative connotations with banking systems. The existing payment infrastructure must be maximised for electronic payment to increase. As competition between payment service providers increases changes in providers may be more frequent and add confusion with regards to processes for recipients.

There are two interbank retail systems functioning in the Philippines which can handle large volumes of cash (Acosta et al., 2019). They run slightly different models. PESOnet payments are not made in real-time but at the end of each payment cycle (there are several in each day). InstaPay transfer money in real-time but charge more for transactions. PESOnet is more suited to planned payments, such as social cash transfers.

Uganda

In Uganda, the mobile network operator MTN's Mobile Money Unit is used to make payments for the cash transfer initiative (Zimmerman et al., 2014). The Unit does not use MTN's commercial mobile money product. Insufficient agent or network presence meant that MTN could not supply the mobile money product but used specialised pay phones to process payments on the platform. It provided either electronic or manual payments depending on network availability. The e-payment is made through a SIM¹²-embedded card presented to MTN agents. The SIM cards could only be used at specialised MTN payphones. MTN make 20 percent of the payments in cash.

Weak infrastructure and capacity mean that fees are higher with MTN charging the programme 3.5 percent of the amount of each cash transfer. This includes the withdrawal fee, the transaction fee, and the operating fee.

Staff from the programme report considerable logistical difficulties in transporting large amounts of cash to certain districts. MTN had to make it possible for agents to make cash-out payments as supply was not always possible. This meant that MTN needed to contract franchise dealers

¹² Subscriber Identification Module

(or master agents) to move physical cash to sub-counties. Other problems included network outage meaning e-payments could not be made and faulty cards meaning staff could not issue SIM card e-wallets.

The programme was successful in making payments at pay-points efficient so that there were not long queues for recipients once they arrived with the agent. The efficiency was made possible by allowing agents to enter the PIN themselves, so security was compromised. Financial inclusion objectives were sacrificed for efficiency.

Payments were on time and users knew how much they were receiving which helped to build trust. However, there was considerable confusion about payment methods with agents conducting transactions for those who did not understand.

Initially the programme explored an e-payment option where bank-linked point-of-sale biometric identification devices could be used. However, the financial sector infrastructure could not support the design with the high cost of biometric solutions. There were very few point-of-sale terminals already in place.

Kenya

Cash for Assets, in Kenya, is a government and World Food Programme (WFP) cash transfer scheme. Equity Bank were organised to provide a bank account for recipients to receive the cash (Zimmerman et al., 2014). After a competitive bid process Cooperative Bank were more recently selected as the new service provider. The account debit cards (previously from Equity Bank, now from Cooperative Bank) are 'open-loop' meaning they can be used at payment infrastructures provided by different merchants. The programme pays a fee per card and withdrawal fees apply.

The programme used Microsoft Excel to manage data but found it insufficient for managing, cleaning, maintaining and protecting large amounts of data. A new management information system was created but there were data migration problems. WFP partners were used to paper-based systems so had a large shift in ways of working. Inaccurate data delayed registration and therefore payments. Accounts automatically closed after 3 months without use so many accounts had to be reopened creating a significant amount of work.

Recipients gathered on the same day to receive payments despite being asked to spread visits out which caused long queues and insufficient liquidity. Where not enough cash was available some agents insisted that recipients buy goods from the store or come back several times for smaller instalments. The bank ended up changing the agent fee agreement and charging more for larger withdrawals which were not covered by the programme and incurred by the recipients. Unreliable payments create mistrust over e-banking systems.

Recipients received financial literacy training from Equity but some customers still reported confusion over their eligibility, how often and how much payments were, and how the programme worked. Some believed they were missing money and thought the agents were stealing. Programme rules prohibited agents from entering customer PINS but this was found to happen in some cases when customers forgot their PINS. The financial training explained how to use the point-of-sale device but did not provide practical demonstrations.

WFP had first attempted to set up a mobile based solution but network connectivity was not strong enough to process payments.

3. Lessons and considerations

Lessons for setting up e-payments for social cash transfers

A World Bank social protection policy note discusses three approaches for improving the digitalisation of social cash transfers in the Philippines (Acosta et al., 2019). The first approach is the **Straight-Through payment delivery mechanism** with key critical institutions. Payment orders go through an inter-bank payment system. The system promotes choice for consumers. It is also good for transparency as intermediaries are not involved, payments go straight through to beneficiary accounts. However, the time it takes for payments to be received is unpredictable. It is relatively low-cost. Automation can lead to administrative savings. Ideally the treasury would have access to the interbank payment system selected. Basic deposit accounts are required. Good financial infrastructure should include a good number of branches, ATMs, bank agents and electronic acceptance (Acosta et al., 2019).

The second approach is the **Straight-Through payment with supplementary cash disbursements of social grants**. This is the co-existence of the above approach with different payment options in remote areas. The third approach is **gradual migration to Straight-Through**, allowing time for learning and systems adjusting (Acosta et al., 2019).

Common themes are identified from the CGAP case studies for recommendations in setting up e-payment for cash transfers in Haiti, Kenya, the Philippines and Uganda (Zimmerman et al., 2014):

- **Country-level readiness was overestimated**, particularly for mobile solutions. Infrastructure is required outside of urban areas. Biometric solutions are expensive, payment terminals are limited and there were problems with network coverage. Programmes often ended up reverting to cash payments.
- The **technical capacities for a shift to e-payments were underestimated**. High quality management information systems (MIS) are required (Excel was insufficient). Technical capacity is needed for cleaning enrolment data, collecting information for regulatory standards, and reconciling payment records among implementers. The case study programmes struggled to create functional and coordinated systems. Errors and delays were costly and led to poor service for customers. There were crowds trying to register in Haiti which caused stress and mistakes (Acosta et al., 2019).
- **Pressure on design and implementation**. Donors or governments often wanted to modify schemes in some way which put pressure on programme management. Governments often wanted scale-up quicker than was possible (Acosta et al., 2019).
- **Difficult logistics with agent networks in distant locations**. It was not always possible to supply agents with the necessary cash for all payments. Master agents were then employed to move physical cash to subcounties. Payout processes were often chaotic. Recipients often wanted payment on the day of arrival causing queues and insufficient liquidity. In Uganda the programme distributed money efficiently only by giving the agents control of the payments process who entered the personal identification number (PIN) on behalf of recipients. This reduced financial inclusion and opened up the possibility of agent theft or misconduct. In the case studies, agent customer service was often poor.
- **Programme and payment method training is important for recipient capability, availability of payments, and timeliness**. Recipients need training on “programme literacy” as well as “financial literacy”. Particularly using and memorising their PIN, understanding how much money they should receive, and how to get in touch with customer services. Timely payments help to reduce confusion and build trust. Unreliable

payments made recipients more likely to forget how to use their payment method, less likely to commit to how to receive the payment, and more likely to opt to get all the cash out immediately. In the Philippines, security guards helped recipients use the ATMs when the programme was new, which made them more comfortable with the process (Acosta et al., 2019).

Key recommendations:

- Ensure reliable payments first.
- Create sufficient communication channels with recipients. They need to know how much their payment should be, how to conduct payment transactions, be informed when there is a delay, and be taught where to go for troubleshooting.
- Incorporate contingency planning and risk assessments.
- Outline a value proposition for all stakeholders.
- Be prepared to invest in adequate infrastructure.

Regulation for adoption of digital payment

A study looking at the adoption of digital payment systems in Africa identified a number of lessons (Ferguson et al., 2019). Regulatory innovation, such as in Kenya, is recommended for successful uptake of new technologies. The Central Bank of Kenya used a ‘test and learn’ approach to regulation (Muthiora, 2015) which is more successful than pre-emptive regulation. This was found to change behaviour more effectively than bank-led regulatory styles, such as in Nigeria, where regulatory bodies were initially weak leading to power struggles with operators (Briggs & Brooks, 2011).

Interoperability

Interoperability is the ability for information to flow between different operating systems and platforms and is a key issue in retail payment mechanism innovation (Bajal et al, 2012). Most digital payment systems are closed-loop so customers cannot interact with other services (Riley & Kulathunga, 2017). Interoperability - the ability for different players such as banks, governments, card acquirers, customer to send, receive and process payments – is preferred. However, improving interoperability may mean higher rates, lower levels of accountability, and lower levels of investment. Planning the level of interoperability should be based on the financial landscape within a country, considering deepening target and strategic agenda. Interoperability requires technical compatibility and commercial agreement. Mobile networks are interoperable at a technical level, but less so on a functional or practical level. Mobile money interoperability needs to be platform-level so that customers can send between services, agent-level so that agents of one service can serve customers of another service, and customer-level (able to access through different SIM cards).

JoMoPay successfully achieved interoperability with the Central Bank of Jordan introducing ‘mobile payment services instructions’ and an accompanying operational framework (Boakye-Adjei et al, 2014).

The Bank of Thailand has established the National Payment Message Standard to support the use of corporate e-payment transactions (Riley & Kulathunga, 2017). This supports straight-through processing and reduces the cost of electronic connectivity. The Bank had a working group developing a payment system roadmap with common standards.

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